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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,421	07/17/2003	Toshiaki Sasaki	00684.003436.	9617

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EXAMINER

STEPHENS, JUANITA DIONNE

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,421

Applicant(s)

SASAKI ET AL.

Examiner

Juanita D. Stephens

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Preliminary amendment filed 7/17/04.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) 8/1, 8/2, 8/5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/17/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Continuation of Disposition of Claims: Claims pending in the application are 1-5, 6/1, 6/2, 6/5, 7/1, 7/2, 7/5, 8/1, 8/2, 8/5, 9/1, 9/2, 9/5, 10/1, 10/2, 10/5, 11/5, 12/5, 12/11/5.

Continuation of Disposition of Claims: Claims rejected are 1-5, 6/1, 6/2, 6/5, 7/1, 7/2, 7/5, 9/1, 9/2, 9/5, 10/1, 10/2, 10/5, 11/5, 12/5, 12/11/5.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1 The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 6/1, 6/2, 6/5, 9/1, 9/2, 9/5, 11/5, 12/5, and 12/11/5 are rejected under 35 U.S.C. 102(b) as being anticipated by Kashino et al. (US 6,007, 187).

Kashino et al. discloses a liquid ejection head (Fig. 7) comprising: 1) a liquid flow path (3), 2) an ejection outlet forming member (orifice plate 14), which comprises a part of a wall of said liquid flow path (lower surface of orifice plate 14 facing ejection liquid) and which forms an ejection outlet (11) for ejecting a droplet of liquid, the ejection outlet having a recessed portion recessed from a plan in which the ejection outlet is formed (recessed portion formed by ejection outlet), 3) a heat/energy generating element (2) provided at a position opposed to the ejection outlet (col 13, lns 38-39), for generating a bubble in the liquid by application of heat to the liquid (col 13, lns 41-43), 4) a restrictor portion (movable portion 6) having an opening (slit 8) and provided at the recessed portion of the ejection outlet (col 13, lns 21-25), wherein the liquid forms a meniscus and is retained in the ejection outlet such that said restrictor portion is within the liquid, 5) wherein an area S_o (2 μ m) of the opening of said restrictor portion (col 14, lns 11-13) and a surface area S_h (48 μ m X 46 μ m) of said heat generating element (col 13, lns 39-40), satisfy the following inequality $S_o \leq S_h$, 6) wherein a thickness c (5 μ m) of said

restrictor portion (movable portion 6) (col 10, lns 50-52) and a height e of said liquid flow path (3) measured in a direction in which the ejection outlet and said energy generating element face each other, satisfy the following inequality $c \leq e$ (as clearly shown in Fig. 7), 7) wherein a thickness c (5um) of said restrictor portion (movable portion 6) (col 10, lns 50-52) and a thickness d of said ejection outlet forming member (orifice plate 14), measured between a plane in which the ejection outlet is formed and a plane of said restrictor portion, satisfy the following inequality $c \leq d$ (as clearly shown on Fig. 7), 8) wherein said restrictor portion (movable portion 6) is disposed in a middle in a direction of a thickness of said ejection outlet forming member (orifice plate 15) (as shown on Fig. 7), and 9) wherein the liquid is a recording liquid usable for inkjet recording (col 10, lns 41-42).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7/1, 7/2, and 7/5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashino et al. (US 6,007,187) in view of Kudo et al. (5,821,962).

Kashino et al. discloses a liquid ejection head (Fig. 7) comprising: 1) a liquid flow path (3), 2) an ejection outlet forming member (orifice plate 14), which comprises a part of a wall of said liquid flow path (lower surface of orifice plate 14 facing ejection liquid) and which forms an ejection outlet (11) for ejecting a droplet of liquid, the ejection outlet

having a recessed portion recessed from a plan in which the ejection outlet is formed (recessed portion formed by ejection outlet), 3) a heat/energy generating element (2) provided at a position opposed to the ejection outlet (col 13, Ins 38-39), for generating a bubble in the liquid by application of heat to the liquid (col 13, Ins 41-43), 4) a restrictor portion (movable portion 6) having an opening (slit 8) and provided at the recessed portion of the ejection outlet (col 13, Ins 21-25), wherein the liquid forms a meniscus and is retained in the ejection outlet such that said restrictor portion is within the liquid, 5) wherein an area S_o ($2\mu\text{m}$) of the opening of said restrictor portion (col 14, Ins 11-13) and a surface area S_h ($48\mu\text{m} \times 46\mu\text{m}$) of said heat generating element (col 13, Ins 39-40), satisfy the following inequality $S_o \leq S_h$, 6) wherein a thickness c ($5\mu\text{m}$) of said restrictor portion (movable portion 6) (col 10, Ins 50-52) and a height e of said liquid flow path (3) measured in a direction in which the ejection outlet and said energy generating element face each other, satisfy the following inequality $c \leq e$ (as clearly shown in Fig. 7), 7) wherein a thickness c ($5\mu\text{m}$) of said restrictor portion (movable portion 6) (col 10, Ins 50-52) and a thickness d of said ejection outlet forming member (orifice plate 14), measured between a plane in which the ejection outlet is formed and a plane of said restrictor portion, satisfy the following inequality $c \leq d$ (as clearly shown on Fig. 7), 8) wherein said restrictor portion (movable portion 6) is disposed in a middle in a direction of a thickness of said ejection outlet forming member (orifice plate 15) (as shown on Fig. 7), and 9) wherein the liquid is a recording liquid usable for inkjet recording (col 10, Ins 41-42). Kashino et al. does not disclose wherein a diameter of the opening of said

restrictor portion changes along a direction of ejection of the liquid through the ejection outlet.

Kudo et al. at least teaches wherein a diameter of the opening of said restrictor portion (movable member 31) changes along a direction of ejection of the liquid through the ejection outlet (col 24, Ins 19-21; Fig. 253). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kashino et al. by substituting restrictor portion (movable portion 6) of Kashino et al. with the movable member 31 of Kudo et al. for the purpose of directing the bubble concentratedly toward the ejection outlet with stability.

5. Claims 10/1, 10/2, and 10/5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishinaga et al. (US 6,457,816 B1).

Kashino et al. discloses a liquid ejection head (Fig. 7) comprising: 1) a liquid flow path (3), 2) an ejection outlet forming member (orifice plate 14), which comprises a part of a wall of said liquid flow path (lower surface of orifice plate 14 facing ejection liquid) and which forms an ejection outlet (11) for ejecting a droplet of liquid, the ejection outlet having a recessed portion recessed from a plan in which the ejection outlet is formed (recessed portion formed by ejection outlet), 3) a heat/energy generating element (2) provided at a position opposed to the ejection outlet (col 13, Ins 38-39), for generating a bubble in the liquid by application of heat to the liquid (col 13, Ins 41-43), 4) a restrictor portion (movable portion 6) having an opening (slit 8) and provided at the recessed portion of the ejection outlet (col 13, Ins 21-25), wherein the liquid forms a meniscus and is retained in the ejection outlet such that said restrictor portion is within the liquid,

5) wherein an area S_o ($2\mu\text{m}$) of the opening of said restrictor portion (col 14, lns 11-13) and a surface area S_h ($48\mu\text{m} \times 46\mu\text{m}$) of said heat generating element (col 13, lns 39-40), satisfy the following inequality $S_o \leq S_h$, 6) wherein a thickness c ($5\mu\text{m}$) of said restrictor portion (movable portion 6) (col 10, lns 50-52) and a height e of said liquid flow path (3) measured in a direction in which the ejection outlet and said energy generating element face each other, satisfy the following inequality $c \leq e$ (as clearly shown in Fig. 7), 7) wherein a thickness c ($5\mu\text{m}$) of said restrictor portion (movable portion 6) (col 10, lns 50-52) and a thickness d of said ejection outlet forming member (orifice plate 14), measured between a plane in which the ejection outlet is formed and a plane of said restrictor portion, satisfy the following inequality $c \leq d$ (as clearly shown on Fig. 7), 8) wherein said restrictor portion (movable portion 6) is disposed in a middle in a direction of a thickness of said ejection outlet forming member (orifice plate 15) (as shown on Fig. 7), and 9) wherein the liquid is a recording liquid usable for inkjet recording (col 10, lns 41-42). Kashino et al. does not disclose wherein the liquid is a medicine to be inhaled into a lung.

Ishinaga et al. at least teaches a wherein the liquid is a medicine to be inhaled into a lung (col 41, lns 23-27). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Kashino et al. by substituting the liquid (i.e. medicine) of Ishinaga et al. for the purpose utilizing a liquid whose properties are not strong against heat.

Allowable Subject Matter

6. Claims 8/1, 8/2, and 8/5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

The limitation of wherein the opening of said restrictor portion includes a plurality of bores. This solves the problem of allowing a plurality of liquid droplets to simultaneously be ejected from each ejection outlet.

Contact Information

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



JS

10/2/04

Juanita D. Stephens
Primary Examiner
Art Unit 2853